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The American Horologist

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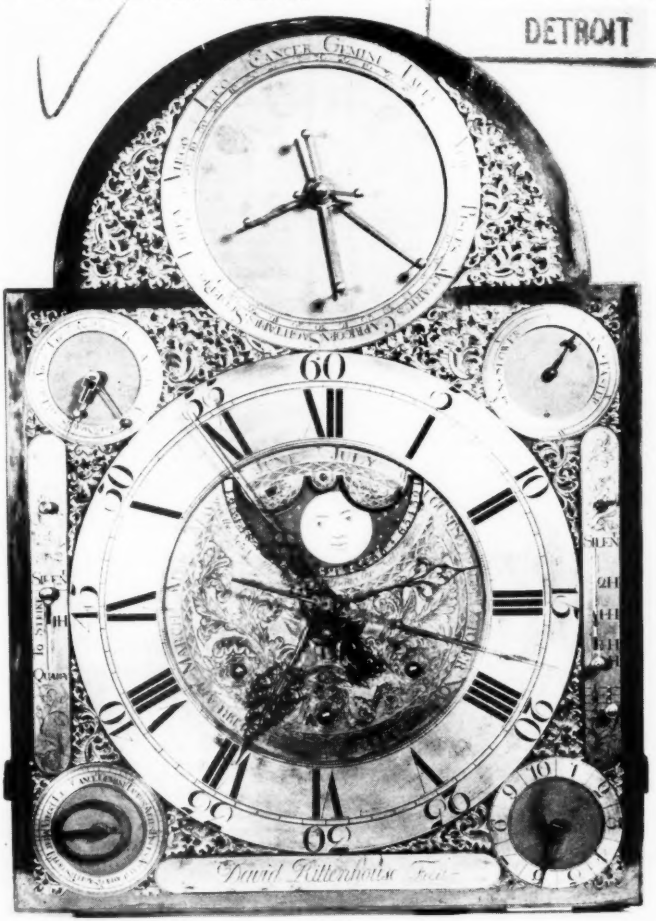

Vol. V APRIL, 1940 No. 4

The American Horologist

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THE AMERICAN HOROLOGIST

Published monthly by Roberts Publishing Company, Denver, Colorado, in the interest of Horological and Jewelry Industry. To inculcate the principles of Fraternal and Commercial Advancement; to promote the welfare and enhance the betterment of the industry; to cultivate good fellowship and a higher degree of knowledge in Horology and Jewelry industry.

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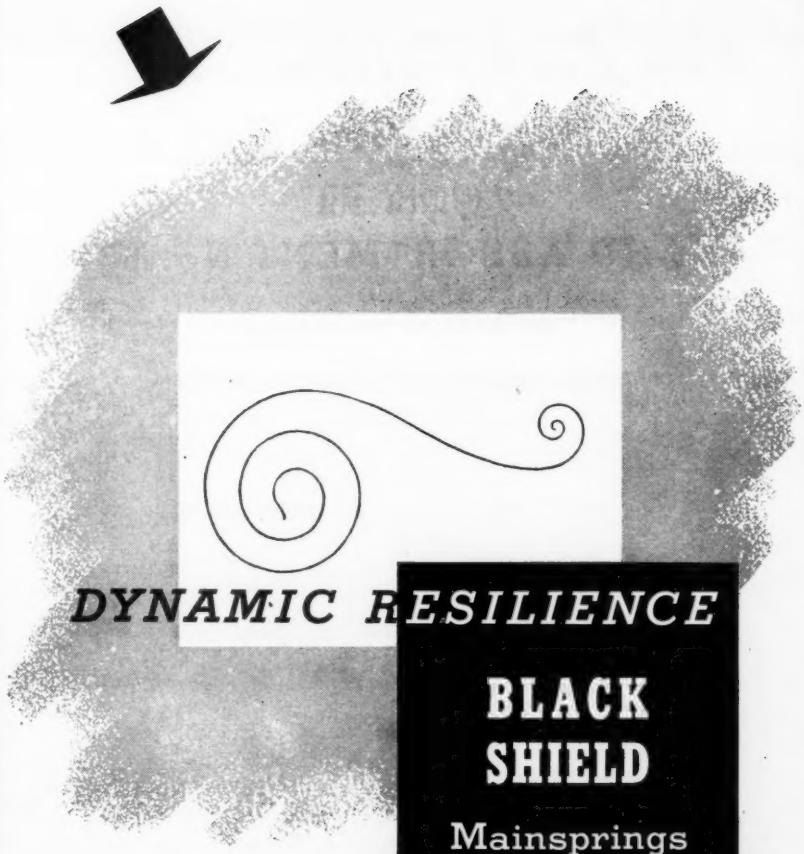

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BOSTON BUFFALO ATLANTA

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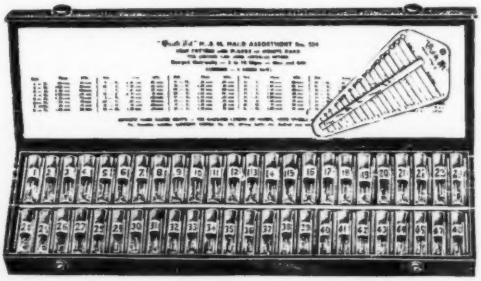
Socket on Minute Hand

"Quick Fit"

HAND ASSORTMENT No. 834

Metrically gauged Hour and Minute Hands from 3 to 10 ligne—
with Socket on Minute Hand.

"Quick Fit" Hand Gauge FREE With Each Assortment



All Minute Hands Have Sockets for Correct Fitting

Gauge measures length of Hand, Cannon Pinion and Hour Wheel

"QUICK FIT"
Assortment No. 834

48 Bottle Cabinet contains 96 pair H. & M. Hands—1 pair each Blue and Gilt in Bottle. **SOCKET ON MINUTE HAND** assures easier and better fitting. All modern Watches, such as Bulova, Gruen, etc., now have **Sockets on Minute Hands.** This Assortment will take care of **all** your Bracelet hand replacement jobs. Each bottle is labeled to correspond with chart showing length and hole size of both Hour and Minute Hands.

—Price: $8.40

If you prefer 2 Pairs of Blue Hands instead of the Blue and Gilt Hands, specify Assortment No. 834B.

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Sixth National Convention and Exhibition

of

United Horological Association of America

Incorporated

The eyes of all Horologists, Jewelers, Distributors, and Manufacturers are turned towards CLEVELAND, OHIO where on May 5-6-7 will be assembled for the Sixth time those men of the industry who are conscientiously and eagerly trying to bring about a physical, mental, and material change in our Profession and Industry. A change for the better of all within it.

You and everyone in each branch of our industry should try and be present to learn what plans are being made to improve conditions, etc.

Down Town Air View of Cleveland

Cleveland offers you and your family a cordial welcome with thousands of pleasurable moments and places to spend them.

Our Convention Chairman has arranged a beautiful and educational full day's tour and entertainment.

A trip to the Warner and Swasey plant with a sight-seeing tour enroute, arriving by 11 a.m.; leaving at 12:30 p.m. for Nela Park with a sight-seeing tour enroute, arriving at Nela Park by 1:15 p.m. (Luncheon at Nela Park, 1:30 to 2:15 p.m., thence visit through the Light Institute from 2:15 to 3:45 p.m.) returning to the Hotel via a sight-seeing route, arriving by 4:30 p.m.

In connection with the above trips we should like to state that Nela Park is the home of the National Electric Lamp Works of the General Electric Company in Cleveland.

More interesting displays, educational programs. Latest in legislation and your future.

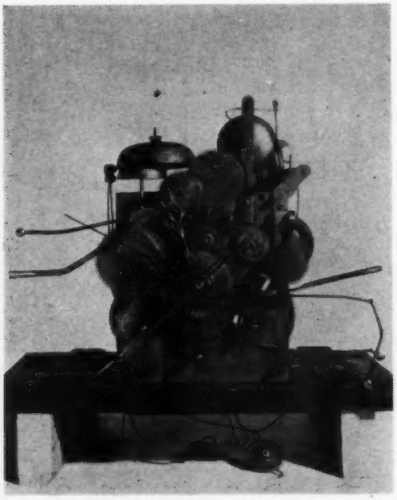
Be present and know what plans are being made. Don't go by hearsay—it is often wrong or biased. Learn the facts.

Rittenhouse Clock Keeps Ticking After Long Silence

By Alexander Schamban

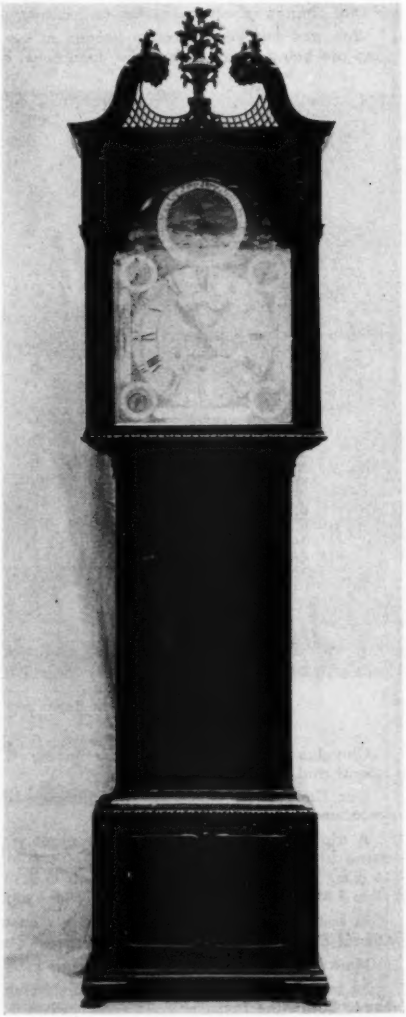
Photos Courtesy Franks—By Gladys Muller.

ONE hundred and sixty-three years ago, David Rittenhouse, Colonial astronomer and clock maker, made an intricate grandfather's clock in an effort to surpass all previous models by early American colonists or Old World craftsmen. Josiah Potts, wealthy Philadelphian of Quaker faith, had ordered the clock. He insisted that Rittenhouse place the mechanism in the finest cabinet available.



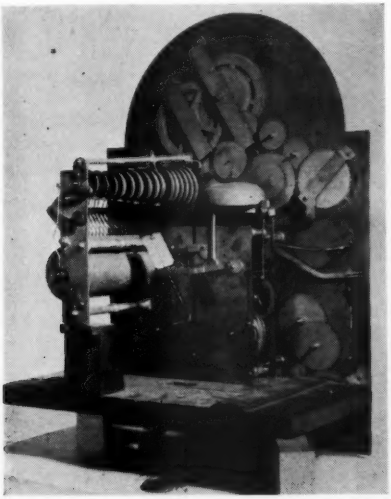
Records as to the time that Rittenhouse devoted to making the clock, his last piece of work, are unavailable, but history tells us that upon completion of the timepiece, Potts refused to pay the $640 that its maker asked for it. Either he felt that the clock had been overpriced or that Rittenhouse could be bluffed into taking a lower figure. The Colonial craftsman, however, was not so easily influenced and turned about and sold the clock to Thomas Prior.

The clock became well known in Philadelphia. Scores of prominent people attempted to purchase the clock but all offers were rejected. General William Howe, leader of the British who occupied the Quaker City during the Revolution, offered 120 guineas for it but Prior refused



to sell it. The Spanish Minister was eager to present the clock to his King was unable to purchase it.

Prior died in 1801 and the clock went to William Barton, who wrote a biography of David Rittenhouse. From Barton, it



went to James Swain who in turn sold it to George W. Childs in 1879. The latter's widow, in 1898, presented the clock to Drexel Institute, its present owner. Housed in the technical school's museum, the Rittenhouse product, after thirty-five years of silence, has resumed its time telling activities and attracts hundreds of visitors daily.

In 1906, the clock stopped running. Drexel Institute was unable to secure a clockmaker capable of repairing the instrument. Its old and delicate mechanism did not warrant experimenting of inexperienced hands.

Finally, during the summer of 1939, the Institute discovered that Stanley Woods, Franklin Institute technician, was considered to be the foremost authority on old clocks. Into his eager hands went the delicate Rittenhouse clock. Three months of

diligent and painstaking efforts restored the activity of Rittenhouse's masterpiece.

Aside from the usual attributes of the grandfather clock, this one has the additional feature of playing ten different

(Continued on page 18)

FULCRUM OILS

ABSOLUTELY the HIGHEST GRADE LUBRICANTS EVER PRODUCED FOR

Watches « Clocks » Chronometers

The War Department recognized this when they selected Fulcrum Oil for use on their delicate and intricate instruments and mechanisms.

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Fulcrum Oil Co. Franklin, Pa.

More than 40,000,000 POWERFUL ELGIN MESSAGES FOR GRADUATION!

In Leading National Magazines From Coast to Coast

This advertisement appears in four colors and a brilliant gold in the May 20th issue of Life.
GIFT OF GIFTS...
For your Graduate's Golden Day
Lord Elgin
Lady Elgin
LIFE
Thrill your graduate with a brilliant Elgin
ELGIN
This advertisement appears in four colors in the May 25th issue of The Saturday Evening Post and Liberty; the June 1st issue of Collier's and the June Ladies' Home Journal.
Collier's
WEEKLY

Copr. 1940 by Elgin National Watch Company, Elgin, Ill.

● Coupled with the appeal of the smart new Elgins themselves Elgin's tremendous graduation advertising is designed for quick, important new sales. Millions of attractive, full page, full color Elgin messages appear in the nation's leading magazines. Messages stress Elgin's exclusive new technical advances and fine craftsmanship through four generations.

Active young Americans such as those shown here tell of the tradition and popularity of Elgin for graduation giving. To get the full benefit of Elgin's special promotion for graduation use all the effective local promotion material provided you. Order your new Elgins now!

★ ELGIN ★

FOR 75 YEARS THE GIFT CHOICE OF DISTINGUISHED AMERICAN FAMILIES

N. Y. U. Adds Rare Timepieces To James Arthur Collection

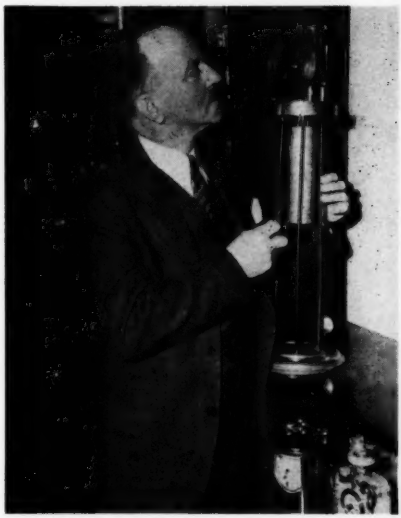
THE James Arthur Collection of Clocks and Watches at New York University, already one of the largest in the world, recently was augmented by the acquisition of 275 antique timepieces, comprising the entire collection of the late John Arthur, Brooklyn manufacturer and son of the founder, it was announced recently by the collection curator, Professor Carlos de Zafra.

The collection was also increased by the acquisition of a number of rare early American and English clocks including the works of Simon Willard, David Rittenhouse, Theodore R. Timby, and John Arnold.

Obtained from the estate of Mr. Arthur, the watches, dating back to 1600, included three valuable works of Brequet, noted French watchmaker. A jewęled-enameled timepiece with gold movements made by William Ilbery of England about 1810 was also added to the collection. The Ilbery watch was said to have been owned at one time by the late Czar Nicholas of Russia and presented by him to the Grand Duke Alexander.

Among the antique American clock acquisitions was a tall hall clock made by David Rittenhouse about 1760, believed to be one of the earliest works of this Colonial crafstman. The ornamented brass dial bears both Roman and Arabic figures and indicates seconds, minutes, hours and the days of the month.

Another interesting addition is a solar timepiece designed by Theodore Timby of Baldwinsville, New York. He arranged a terrestrial globe in such relation to a dial plate and index on a clock that the culminating time of the sun and the mean time can be observed simultaneously. It was built about 1870. In addition to telling the true solar time and the clock time simultaneously, the observer is further able to tell instantly the difference in time between various localities, through the use of the meridians on the globe and the dial plate. The clock is a shelf-sized piece, with a globe located in the middle of its case on a horizontal axis, in combination with a revolving dial. The globe on the clock was manufactured by Gilman Joslin



Professor Carlos de Zafra, holding a Simon Willard Clock.

of Boston, one of the foremost mapmakers of his time.

The Simon Willard clock in the new acquisitions was built as a timepiece to check astronomical observations. It stands in a glass globe 32½ inches high, believed to

Montana Moss Agates

LADIES' RING 8x10 m.m. Rect. stone mtg. sterling, yellow G. P. trim at $12.00 doz.
TIE CHAIN "Nu Lok" mtg. yellow gold Finish at $10.50 doz.

Agates are in assorted markings.

Sample of each at $1.90 Postpaid
Prices are net—postpaid.

Montana Gem Shop
Miles City, Montana

Newall Crown Assortments

Crowns Are 1/10th 14K Gold Filled

The crowns in these assortments are all 1/10th 14K, gold filled. They are all made with an extra fine finish and perfect threads.

All these assortments are assembled in the new 72-bottle, Tu-tone wood cabinets with the walnut sides and white linden wood tops and bottoms.

Each assortment contains a descriptive chart so that it can easily be refilled.

These assortments contain one each of 72 numbers of crowns for ladies' and men's bracelet watches from baguette to 13 ligne in styles for both American and Swiss watches.

No. 363—Cabinet of 6 dozen (all yellow), 1 each of 72 numbers..... $10.50

No. 363-W—Cabinet of 6 dozen (all white), 1 each of 72 numbers..... $10.50

This assortment contains 36 numbers each in white and yellow bracelet crowns.

No. 362—Cabinet of 6 dozen (36 white and 36 yellow)..... $10.00

Many other assortments are shown in the Newall 1940 Finger Print Catalog. Ask your material jobber for a copy.

ORDER FROM YOUR MATERIAL SUPPLY HOUSE

THE NEWALL MFG. CO. CHICAGO, ILLINOIS

be the original, and has a center movement, single weight, and anchor escapement.

Another interesting item is the "Regulator Clock" made for and to the specifications of James Carratt, the inventor of the "Cosmochronotrope," which was acquired by the collection last year. The "Regulator Clock" was built by George A. Jones and Company of New York City somewhat prior to the "Cosmochronotrope" in about 1875, Professor de Zafra said. "The acquisition is an exceptionally high grade specimen of this type of clock. It has a 'dead beat' escapement with a seconds pendulum, and has been constructed to allow temperature compensation throughout, particularly between pallet and pendulum," the curator said.

Prominent among the new English pieces is a John Arnold chronometer which bears the number 491, and was built by this famous clock maker, about 1760, in response to the British government's desire for instruments that would keep correct time at sea. Arnold was awarded a prize of 3,000 pounds for his investigations and inventions in connection with chronometers.

The James Arthur Collection of Clocks and Watches now consists of more than 2,000 objects which present the story of the evolution of timekeeping from the simplest sundial and hour glass to clocks having four dials and complicated mechanism. It was assembled by the late James Arthur, Brooklyn manufacturer, over a period of forty years at a cost of more than $150,000 and was presented to New York University in 1926. Since that time rare clocks and watches, enough in number and value to constitute an important collection in themselves, have been added to the original gift. Those acquired during the past year alone would give distinction to any collection in which they might be placed, Professor de Zafra said.

In addition to his duties as curator of the James Arthur Collection, Professor de Zafra is a member of the faculty of the University's College of Engineering and is director of the Gage Laboratory at University Heights.

YOU CAN BUY THE WORLD'S FINEST LOUPE FOR $.00045 PER WORKING HOUR

This is a Bausch & Lomb 3" watchmakers' glass. Its price is 90c. Figured on a single year's use, it costs less than a twentieth of a cent per working hour.

Can you afford to penalize your eyes with eyestrain and impaired efficiency when so fine a loupe costs you so very little?

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Your own jobber can supply you with a variety of Bausch & Lomb American-made loupes.

BAUSCH & LOMB

OPTICAL COMPANY

386 BAUSCH ST. ROCHESTER, N. Y.

Universal Time Measurement System

© 1940 By—CHAS. A. WATKINS

THE object of this article is to present a system of time measurement that can be used by every person and enterprise in the United States without confusion or guessing.

This system is fine enough to measure with a named division of time; the muzzle velocity of a sixteen inch shell; per inch.

The old time system we are now using is so badly mixed up with: Sun, Eastern, Central, Mountain, Pacific, and Daylight tables that it is a wonder any of us can tell what time it really is without a pencil and large sheet of paper.

When nine o'clock was "way along in the middle of the night" A.M. and P.M. was usable, but now with our twenty-four hour days of activity, it becomes a nuisance.

Let me give you an example of what is happening to all of us, all the time, to a greater or less degree.

This incident actually hapened in Detroit Michigan.

Traveler—"What time is it please?"

Resident—"Nine o'clock."

Traveler—"But my train left Boston on time and arrived here on time."

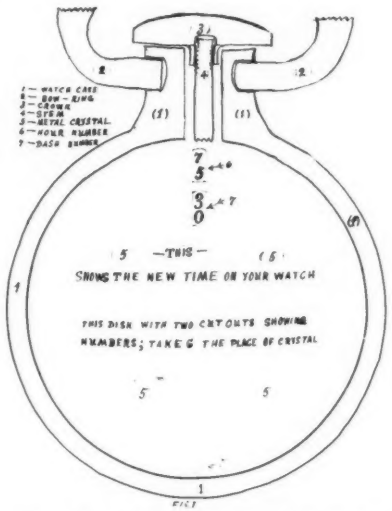
Resident—"That's right. If you have Eastern instead of Daylight your watch says ten instead of nine."

Traveler—"I have an appointment to meet my lawyer, at the boat which he said would dock at nine. I wonder if he meant ten."

Resident—"No that is not right. You see boats use 'Sun' time. In this locality sun time is twenty-eight minutes faster than Central; or in your case, thirty-two minutes slower than Eastern. It's easy to figure out. You see your watch says ten which is really nine Michigan legal time. Now due to the fact that your appointment is with a boat and therefore with Sun time the nine o'clock boat would arrive twenty-eight minutes ahead of legal Central nine o'clock because sun time . . ."

Traveler—"Oh I see. I still have time to make that boat.

"Now, if Eastern ten is nine and Central nine is eighty-thirty-two what time is it?"



Traveler and resident would both have had ninety-two with the new table and would have saved themselves five minutes time.

An insurance policy is or is not in force depending on the legal time in that locality.

In addition to all this we do not utilize all of our daylight because it causes too much confusion of time tables to do so in most localities.

If future generations increase the speed of everything in proportion to the way we have, they will need faster and finer divisions of time. So we may as well plan for the future as well as the present.

Just the other day a fifteen year old school girl said, as she took off her wrist watch and handed it to me: "Please

Refiners to the Horologists of America
GOLD REFINERS
HOOVER & STRONG, INC.
119 W. Tupper St., Buffalo, N.Y.
Ship to us for highest returns-fastest service

clean this watch. I haven't time to wait for it. I'll be back in five minutes." Get it?

Here are the new and old time tables for you to compare. They tell you the number of "Named" divisions in a day.

New Table

100	Hours
10,000	Dashes
1,000,000	Dots
100,000,000	Flashes
10,000,000,000	Instants
1,000,000,000,000	Ions
100,000,000,000,000	Atoms

Old Table

24	Hours
1,440	Minutes
86,400	Seconds

One atom equals .000,000,000,86,400 of one second.

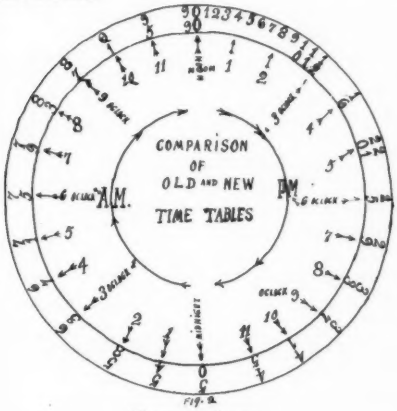


fig. 2

Comparison

If you wish to measure speed that is faster than one second, it is necessary to say, it is so many fractions of a second. To those of us who cannot mentally measure one second, we certainly do not have the ability to mentally measure any finer division unless we give it a name. When we do give it a name, our minds can grasp and register how fine it is by comparison.

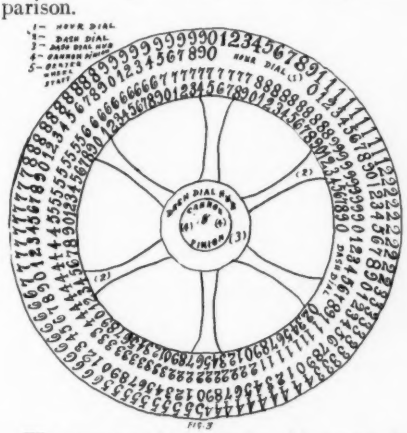


fig. 3

The greatest fault of the old system is that it does not lend itself to comparative measurement.

In order to explain that statement we will use two examples. A "thirty-thirty" Winchester rifle has a muzzle velocity of two thousand two hundred-fifty feet per second. In order to understand the problem properly, we must measure the speed mentally. How far is 2,250 feet? Not quite half a mile. How long is a second? I guess its about—well anyhow the bullet goes about half a mile per second. This is a rather vague and unsatisfactory answer.

With the new table we would say: the

Springtime in Holland

A Jeweler Told Us,

Since displaying our gift goods in his window, 78% more people entered his store, and they not only bought our goods, but also jewelry.

We have a magnificent line of porcelain and glass gift goods, imported from a number of different countries, from 25 cents to $150 sellers.

Completely Illustrated Price Lists Mailed on Application

LEO KAUL IMPORTING AGENCY
115-119 M South Market St., Chicago

bullet goes one foot in two flashes of time. This gives you a very accurate, comparative, mental, time measurement.

The other illustration is:

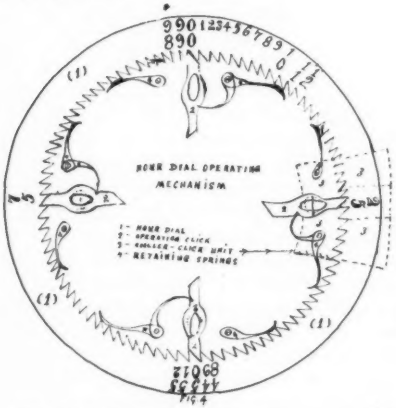
How long a space of time will it take an automobile to travel the distance of one, one thousands of an inch; the road speed being fifty miles per hour.

Using the new table the problem is very simple.

76,032,000,000 One thousandth inches per day
100,000,000,000 Instants of time per day

This is very close to three quarters of one Instant of time to go as far as a piece of tissue paper is thick.

The thickness of tissue paper is the distance; three-fourths of one Instant of time it will take the auto to go that far at 50 M.P.H.



The old time table will tell you it will take .000,000,11—of one second, which is a blank as far as my mind is concerned.

In Operation

The time base would be Arlington noon time signal. Every timepiece in the United States would be set at the long dash to "0" on both dials. Each hour would be fourteen minutes, twenty-four seconds long. Each "Dash" is eight and sixty-four one hundredths long. These two divisions are all that would be needed on a watch.

Below is a comparative table of office hours:

City	Arrive	Lunch	Close
Boston	87	99 to 4	20
Detroit	89	2 to 6	22
Chicago	91	4 to 8	25
Denver	95	8 to 12	29
San Francisco	99	12 to 16	32

These hours correspond to the present nine o'clock, twelve to one and five o'clock hours. In both cases it is the same elapsed time after sunrise.

Example: In New York if you eat your breakfast at 79 (7 A.M.) and you move to Chicago and wish to eat at the same hour of 7 A.M. you would eat at 83. This is the same length of time after sunrise in both cities.

To Change a Watch to the New System

Each hour new time is equal to fifteen minutes (lacking thirty-six seconds) so for all practical purposes we can think of four new time hours as being equal to one "old time" hour.

It takes 216 seconds for the next division (Dash) to make one fourth of a complete circuit. (14 and 4-10 minutes.)

Now we take off weight on the balance wheel so the watch will gain two and one half minutes each hour. The cannon pinion will now make twenty-five circuits of the dial in twenty-four hours. The hub of the "Dash" dial is pressed down firmly on the cannon pinion. A pin on the "Dash" dial engages the pawl on the hour dial holding units (four of them) which operates the hour dial one hour at each contact or four hours for each complete circuit of "Dash" dial. So twenty-five

Cosley Jewelry Company

Wholesale Dealers of
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301-302-303 University Building

Denver, Colorado

complete circuits of the "Dash" dial moves the hour dial, one hundred divisions or one complete circle every twenty-four hours.

A metal disk with suitable cut outs takes the place of the crystal. So to change a watch to the new time—remove crystal, dial, hands, and hour wheel. Adjust the Hour dial at four points using the roller-pawl unit. Press the Dash dial firmly down on cannon pinion. Fit metal disk in place of crystal. Make watch gain one hour a day and your watch will record the new time system.

So here we have a system of time that works for all of us from sun to sun and coast to coast eliminating all confusion.

We should adopt this system for its accuracy and efficiency alone regardless of the other good reasons.

After reading this article, I do believe that any Senator or Representative would have no real objection to adopting this system and making it into law. There would be more or less objections from those who always say—"Let good enough alone." I doubt very much that any one of them would be interested enough to take it into his hands and push it hard enough to make it into law.

One hundred "Hours" make, a day from sun to sun.
Ten thousand "Dashes" will, help out the starting gun.
One million "Dots" my dear, is a division small,
A hundred million "Flash" and still that isn't all.
Ten billion "Instants" now appear to show good will,
A trillion "Ions" sir, will have them beaten till,
A hundred trillion "Atoms" will carry off the show,
With each and every one, a day where'er you go.

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Courses for Success for WATCHMAKERS ENGRAVERS, JEWELERS
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Bowman Bldg., Lancaster, Pa.

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Complete charts for all American watches and for Bulova, Gruen, Glycine, International, Longines, Movado and Omega watches. Hundreds of new sizes for the latest models of Swiss watches.
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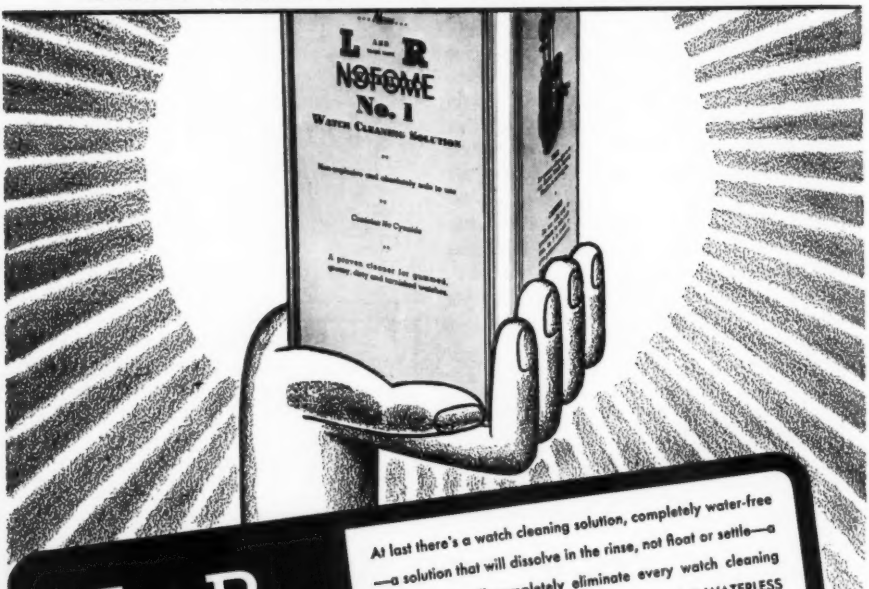
'THE WATERLESS WONDER'



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At last there's a watch cleaning solution, completely water-free —a solution that will dissolve in the rinse, not float or settle—a solution that will completely eliminate every watch cleaning hazard ever encountered;—this is the new L & R WATERLESS NOFOME WATCH CLEANING SOLUTION.

The new L & R WATERLESS NOFOME, a golden amber solution, embodies every refinement to guarantee a perfect watch cleaning job. And by dissolving completely in L & R No. 3 RINSE prolongs the life of the rinse many times its usual span.

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The World's leading Manufacturers of watch cleaning machines and solutions

Made and Guaranteed by

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Replacing Main Spring Hook In Barrel

By W. H. SAMELIUS, *Director, Elgin Watchmakers College*

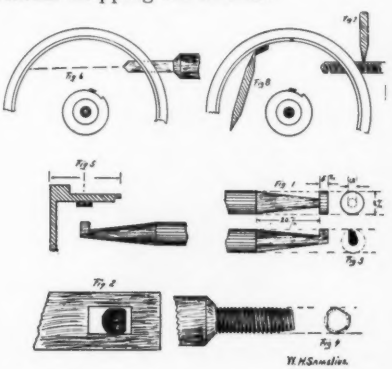
WHILE many watchmakers would say, off-handed, that replacing a hook in the barrel is a very simple operation that can be quickly done by the use of special pliers that would punch a tongue through the side of the barrel, forming a hook inside the barrel. While this is possibly permissible on the cheap grade of watches, we never find this method employed in the higher grade watch.

To replace and repair a hook in barrel we will need some special and simple tools and, naturally, we will make the necessary tools first. The hook end tool such as illustrated in Figure No. 1 for cutting the height of the hook and the sides of the hook, allowing freedom for the hook to fit in the hole of the mainspring, see Figure No. 2. This tool may be made from a piece of round steel stock about 4 mm. diameter, cutting the stock down, leaving a button end such as shown in figure No. 1. Filing away the button, leaving a small tongue end such as shown in Figure No. 3. The tool is then hardened by heating to a cherry red and quenching in water. The surface of the tool is cleaned bright and slowly heated or tempered to a straw color.

Our next tool will be the tap, and by cutting down a piece of stock to the necessary diameter of the hook, threading it in the die plate, cutting away the first four threads to a taper, which act as lead screws so it will enter the hole and pull itself through. The tap is to be filed on three sides, as shown in Figure No. 4. It is then hardened and tempered to a straw color. We are now ready to proceed with our work.

The first move is to locate the center of the barrel, taking the outside dimensions from the outside, or top of the barrel to bottom of barrel, locating the center as shown in Figure No. 5. We then select a drill, its diameter being a trifle more than half the width of the spring. Putting the drill in the lathe, drilling a hole through the barrel, diagonally, as shown in Figure No. 6. We then cut the thread in the hole, using our tap.

Next, take a piece of brass wire of the appropriate size, cut a thread on it, corresponding with the diameter of the tap. Thread the wire into the barrel and mark the approximate length where it should be cut off on the inside of the barrel. The wire is then taken out, the end cut off and threaded back into the barrel, this time, turning it in as tight as permissible, without stripping the threads.



We then cut the wire off as shown in Figure No. 7, using a screwhead file as it is dangerous to use cutting pliers. By using cutting pliers, the plier is liable to stretch and loosen the hook.

The surplus end of the wire projecting from the barrel can be dressed off with a fine cut file and is dressed down with a buff stick.. See Figure No. 7.

We then put the barrel in a wheel chuck and with the hooked tool, which is held in the slide rest, we cut the height of the hook down to the thickness of the mainspring and dress the sides of the hook, if necessary, so it is truely centered and allows ample freedom for the mainspring to locate itself in the barrel, such as shown in Figure No. 2.

If the hook does not have enough slant to it to engage the mainspring securely, a sharp screwhead file may be used to face the front of the hook, giving it the proper slant, see Figure No. 8.

A Horological Count

By S. P. Dayton

Mr. W. M. Matchette of Canoga Park, Calif., a suburb of Los Angeles, traces his ancestry back far beyond the French Revolution, and had that historic event not happened, he would probably have been living in that inner circle of royalty in Paris, or even have been on the throne of France. He is very modest about it because I have known him for many years and it was only recently that he gave me this secret and showed me the manuscript and pictures of a scenario he has written around the royal family of France wherein new and unheard of historical facts will be given to the world.

William Mark Matchett

Every event has been separately copyrighted for protection and such famous men as Hon. Thomas Jefferson, and many other noted Americans of the period are involved in the story in one way or another.

The movie moguls say it will outrival many of the really great pictures and he has had several tempting offers.

I went over the manuscript with him and if I know pictures, its a lot more than he even admits.

Mr. Matchette is a high-grade horologist and has made many special tools to expedite his work. He has a well appointed jewelry store and he and Mrs. Matchette are well known for their hospitality.

RITTENHOUSE CLOCK

(Continued from page 7)

tunes. Its mechanism is in perfect condition. The cabinet encasing the clock is mahogany, an illustration of a master cabinet maker constructing a masterpiece for a master clockmaker's masterpiece.

North Shore Guild No. 3

Regular meeting March 12th.

Officers elected for 1940 are as follows: President, Charles H. Mueller of Lynn; Vice President, George Williamson also of Lynn; Corresponding Secretary, Joseph R. Richard; Financial Secretary, Madeleine Richard; Treasurer, Harold L. Cottle, all three of Salem.

Executive Board: Henry L. Desjardins and Frank E. Main of Beverly, A. A. Mattson and Francis Remon of Salem, Chester W. W. Cook of Lynn. Term up 1941.

Trustees: John J. Aylwin of Salem, Edward Stuart of Saugus, and Raymond Hadly of Salem.

Delegates to State Conventions: Chas. Mueller and George Williamson.

Alternates: Ernest V. LeBel and Harold Cottle.

Joseph R. Richard, *Sec.*

The Horological Society of New York

Held their regular meeting March 5th. Was well attended with several out-of-town visitors.

Henry B. Fried, *Corr. Sec.*

Doose

SOME pay their dues when due.
SOME do before they're due.
SOME never do—HOW do you do,
when your dues are due?

—Courtesy Horo. Society of New York.

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We Are Featuring
THE FAMOUS
Sandsteel Crosscurved Main Spring
For All Makes of Watches
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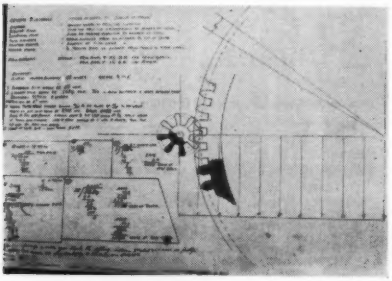
Nashville Horological Club

Held its second meeting March 5th. The meeting was held in conjunction with the regular monthly meeting of Guild No. 1. The subject for the evening being "Power and Its Transmission." Mr. J. E. Coleman, chairman of the meeting, was assisted by Mr. Kennedy and Mr. Lowe—their talk being on "Mainsprings." Mr. Frank Varallo speaking on "Oils," Mr. Coleman on "Gearing," and Mr. Sexton on "Verge to Balance." As so much time was used, Mr. Sexton did not get to explain his subject.



Mr. Coleman furnished several drawings and prints to explain part of his subject.

RALPH F. LANGRECK, *Sec.*

Convention Headquarters, Cleveland, Ohio

Hotel Cleveland, May 5, 6 and 7

Make Reservations Now

Hotel Cleveland

Hartford Watchmakers Guild

The Hartford Guild held their twenty-seventh meeting, February 21st, in the Chamber of Commerce Building, President Charles Stowe presiding.

Action taken on sending a National Delegate to the National Convention.

Committee appointed to form an essay for the Liquidation Contest.

Report by Mr. Lindquist in regards to the head-way being made by the State Association.

During recess motion pictures were enjoyed and supplied by the Telephone and Radio Company through the Amateur Radio Club.

Any member delinquent for a year or more will automatically be suspended, to take effect April 1, 1940.

There will be no meetings during the months of July and August.

Correction in report appearing in February, 1940, issue of THE AMERICAN HOROLOGIST. We neglected to include the Vice President in the new officer personnel, whose name is Henry Richman. (Our apology.)

GEORGE PLATT, *Rec. Sec.*

The Horological Association of Virginia, Inc.

Our association will hold its first annual meeting Sunday, May 26, 1940, at the Monticello Hotel, Norfolk, Va.

Officers and directors of the state association will hold an executive meeting at 1 p. m. on the above date. This will be followed by the regular meeting of the members of the state association which is called for 2 p. m.

We urge all persons interested in the association to attend this meeting, non-members are welcome. Every watchmaker, engraver and jeweler in the state is especially invited to attend. An interesting program is being arranged.

Persons desiring further information should communicate with the secretary, Mr. R. V. Bailey, 200 Portlock Bldg., Norfolk, Va.

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1934—Washington, D. C.
1935—St. Louis, Missouri
1936—Cincinnati, Ohio
1937—Chicago, Illinois
1938—Boston, Mass.
1939—Pittsburgh, Pa.
1940—Cleveland, Ohio
1941—?

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Exec. Secy. U.H.A.A.Inc.
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J. I. Hansen, Colorado
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National Convention Program

UNITED HOROLOGICAL ASSOCIATION OF AMERICA, INC.

SUNDAY, MAY 5, 1940

(Program Scheduled on Daylight Saving Time)

MORNING

9:00 A. M.—National Registration.
Presentation of Credentials.
(All guests and delegates are requested to assemble in Exhibit Hall for important notice and instructions.)
11:30 A. M.—National Trustee Board Meeting. (In office of Executive Secretary, Hotel Cleveland).
12:00 P. M.—Recess for Luncheon.

AFTERNOON

1:00 P. M.—Opening Session, President B. W. Heald, Presiding.
Invocation.
Roll Call of Officers.
Report of Delegates.
1:30 P. M.—Report of Officers.
Report of National Office.
Report of Trustees.
Report of Executive Board.
2:30 P. M.—Report of Legal Advisor.
Report of National Historian.
Report of Standing Committees.
Report of Special Committees.
3:15 P. M.—Report of Convention Committee, J. P. Commer, Chairman.
Appointments of Committees.
Charging Committees with respective charges.
Address: — Harrison F. Babcock, President, Horological Institute of America.
4:00 P. M.—Retire in body to Exhibit Hall.
5:30 P. M.—Recess until 7:30 P. M.

EVENING

7:30 P. M.—President B. W. Heald, Presiding.
Address of Welcome:—Hon. Mayor of the City of Cleveland.
8:00 P. M.—Address:—National President B. W. Heald.
8:15 P. M. — Address: — Frank Foegler, Chairman Executive Board U. H. A. A.
8:30 P. M.—Address:—Walter-Kleinlein, Waltham Watch Co.
8:45 P. M.—Address:—Howard Beehler, Technical Research, Hamilton Watch Company.
9:00 P. M.
Recess until May 16th at 9:00 A. M.

MONDAY, MAY 6, 1940

MORNING

9:00 A. M.—Vice President J. P. Sommer, Presiding.
Report of Resolutions Committee and Discussions.
10:00 A. M.—Sight-seeing trip covering many places of historical and educational interests.

EVENING

7:30 P. M.—Vice President J. P. Sommer, Presiding.
8:00 P. M.—Technical Lecture:—Chas. A. Braun, Weiser, Idaho.
8:45 P. M.—Address:—Robert Hoppe, Elgin Research Dept.
9:15 P. M.—Address:—"Organization and You"—by Executive Secretary Orville R. Hagans.
Recess until May 7th at 9:00 A. M.

TUESDAY, MAY 7, 1940

MORNING

9:00 A. M.—President B. W. Heald, presiding. General Session
10:00 A. M.—Report of Nominating Committee.
10:00 A. M.—
10:15 A. M.—Address:—Geo. W. Feldman, Fulcrum Oil Co.
10:30 A. M.—Address:—Syd, Prague, C. & E. Marshall Co.
10:45 A. M.—Technical Address:—W. H. Samelius, Elgin Watchmakers College.
11:15 A. M.—Retire to Exhibit rooms for demonstrations.
12:00 P. M.—Recess.

AFTERNOON

1:30 P. M.—General Business, President B. W. Heald, presiding.
3:00 P. M.—Election of Officers.
3:30 P. M.—Selection of Next Convention City.
4:00 P. M.—President's Appointments to Standing and Special Committees.
4:30 P. M.—Adjourn SINE DIE.

EVENING

6:30 P. M.—Banquet, Cleveland Hotel, Gold Room.
Address:—Geo. T. Gruen, Gruen Watch Co.
Address.
Address.
Calling on Officers and Others.
Music and Dancing. Bring the Ladies.
All Functions Informal

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BECAUSE THEY DON'T SHRINK

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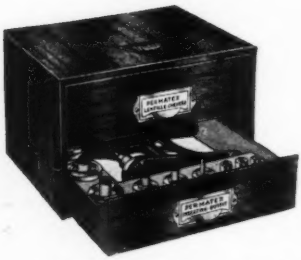

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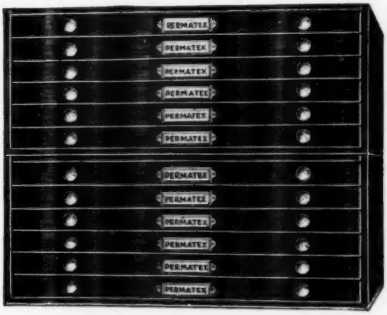

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Denver Guild

Do watchmakers like to talk? We'll say they do! At our last meeting of March 8th, we had a newscast of news from trade magazines all over the world. This brought out much interesting information and a spirited discussion.

Then we had a round table discussion led by Mr. Carl Lundgren. Questions were handed in by everyone and answered by anyone who desired to comment on that subject.

Attendance was larger than usual. Pleasure was evidenced by everyone. Goodwill and friendliness was the order of the day.

WALLACE STUART, *Sec.*

Tennessee Watchmakers' and Jewelers' Association

Will hold their Sixth Annual Convention in Knoxville, Tennessee, May 5th, 6th and 7th, at the Andrew Jackson Hotel. Convention Chairman—Mr. B. A. Ruwe, 619 Market Street, Knoxville.

From all reports this is going to be one of our largest conventions. Prominent technical speakers, as well as others of the jewelry industry, will give interesting talks. The manufacturers and jobbers in the trade will have exhibits. All from throughout the southern territory are invited to participate.

RALPH F. LANGRECK, *Sec.-Treas.*

New Haven Watchmakers' Guild

New Haven watchmakers installed their new officers, January 4th. A large attendance with complete and final reports as to the activities of the organization were had, after which the following officers took their chairs: Mr. Bowers, President; Mr. Whittlesey, Vice President, Mr. Scehle, Treasurer, and Mr. W. Brownstein as Secretary.

Preparations are now being made for a large banquet April 4th. All jewelers will be invited to attend at the expense of the guild.

WILLIAM BROWNSTEIN, *Sec.*

Worcester Guild No. 2

Regular meeting held on March 4th and officers for the year were elected.

Elected: President, W. D. Hebert; Vice President, Raymond F. Perreault; Secretary, J. Edward Bogage, and Treasurer, Henry A. Laventure.

Executive Committee: Clifford N. Barton, chairman; A. E. Brown, Ralph Bogage, Ralph A. Jacques, William Hebert and George Lajoie.

Installation and the annual dinner dance will be April 18th at the hotel. The next meeting will be April 1st.

Southeastern Iowa Horological Guild

Held its monthly meeting at Fairfield, March 11th, presided over by Vice President Roy Hinson. Following the meeting, members decided to participate in the Educational Program, as presented by Board Member D. L. Thompson, and the complete course cost be set aside for this specific purpose.

Our guild hopes that all other affiliated groups will quickly avail themselves of this program.

O. BOOKIN, *Sec.*

Diamond Cutters

By C. E. DELONG

I have been requested to give my opinion as to the practicability of the use of diamond cutters by the average watchmaker. First of all we must understand that the use of the liamond cutter is quite limited and only practical when used on soft metals, such as brass, nickel, gold and various plastic materials; and while it will cut carbon steel at a blue temper—giving a mirror finish, it would soon dull and require re-sharpening. But on other metals not containing carbon they will retain their keen edge for a long period of time.

Let us now consider for what purposes the watchmaker could use the diamond cutter? We may say for the stripping of jewel settings, for facing and cornering jewel settings, cornering plate recesses,

and for making a finish cut on most any part being turned in the lathe where a beautiful polish surface is desired.

Then we should consider the objections to their use, particularly in the hands of the inexperienced workman. First of all, they are quite expensive—generally ranging in cost from $15.00 to $50.00, and can only be procured from certain concerns specializing in that kind of work. Regular die lapadists that cut gems are not prepared to properly make these cutters. In the hands of the inexperienced workman a cutter may be easily damaged or ruined and the repair and resharpening is sometimes nearly as expensive as the first cost of the cutter for this reason. I could not recommend their use, unless the workman should be prepared to grind and sharpen his own cutters. The writer began using diamond cuters in 1908 and soon realized if I were to continue their use, I must learn to make them myself. This I did and have used them continually ever since. In watch factories they are being used extensively and have proven to be practical and economical. They are most generally used on machines where a finished cut is required. The cutter having a positive automatic feed is regulated so as not to put an over-strain on the cutter—in that way they will produce a most beautiful cut for many thousands of operations with a minimum variation.

I am inclined to think that many watchmakers get the wrong impression of the diamond cutter. They seem to think that it will stand most any sort of use and last forever and that they could use it with perfect success without previous experience. Such, however, is not the case. It requires certain knowledge and experience to be able to know just how the various cutters must be shaped for any particular kind of work and equally important how it must be presented to the work being done in order to give the required finish of cut.

In conclusion, I would say that the watchmaker doing a regular line of watch repairing would not have work enough for their use to justify the expense.

If you are a model maker or instrument maker and have considerable making of parts in the lathe that require a beautiful finish cut, the diamond cuter is most valuable and well worth their investment.

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The Albany District Horological Guild has taken up cooperative advertising. Reports on first attempt are most gratifying. Below is reproduction of 2-column, half-page ad.

He Tells HIS WATCH
What Time It Is!
YOU know the man.
He carries a watch that was built with care and pride.
When he bought it, he was told that it was one of the best watches made.
It was.
But this man thought he could treat it with casual indifference. He thought that because it was a fine watch it would stand up under neglect — and still keep perfect time.
He was wrong.
Now he's telling his watch what time it is.
When its hands point to 8:30 he says: "8:37."
He wears down his nerves doing mental arithmetic whenever he wants to know the time.
Oh, yes. He's taken that watch to be repaired.
But—can you believe it?
He gave this delicate instrument — which took a year to make, which contained over 200 individual parts—to a man who offered to "fix it up" at a "bargain price!"
He's still telling his watch what time it is.
Give that masterpiece, your watch, the treatment it deserves. And, when it needs adjusting or repairing, entrust it to men who take pride in the beauty of finished craftsmanship.
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Business Management for Watchmakers

Address by

SYDNEY W. PRAGUE,
General Sales Mgr. of C. & E. Marshall Co. at Oklahoma Horological Associations' State Convention, Sunday, April 7, 1940

It is often said or felt by each one of you—"I should be making more money!" This is only a natural reaction that all men in all walks of life get at different times. Sometimes by changing jobs, you are able to corral a few more dollars—sometimes by getting the nerve screwed high enough, you ask the boss for a raise. Sometimes you get it, other times he says, "can't afford it."

I contend this method of raising the standard is so full of loop holes that it is like a sieve. In the first place it has no substantial background, or no bulwark, to hold it up in case the answer is "no," when you go to the boss.

I believe if the problem is worked right, that the boss will come to you, if he is the right sort of fellow.

The problem is *yours* and the facts must be faced by *you* and overcome by *you.*

Out of the dollar sale of the repair department must come your wages, and a net profit for the operator or owner; or, in cases of a self-owned business a reserve must be accumulated for expansion of the business, or a nest egg for the "rainy day," depending on how you have projected the business.

A conservative breakdown of the dollar sale—we will say—is 50% for labor; 10% for material; and 40% gross to be used as the part returned to the business for operations, out of which the owner is to glean a net profit.

With this sort of breakdown it is *known* that your wages is based on 50% of the sales, and it is up to *you* to produce. Modern business today requires streamlined production methods and since *your* livelihood is based on a standard, it certainly behooves *you* to take an active and willing part in insisting and aiding production angles.

The first step confronting you is to aid in establishing a correct and fair method of records. Production records are sadly neglected in our profession, and without actual records nothing is ever going to happen to do any permanent good. The department will always remain "in the dark," and nobody will know what is fair and what isn't fair. Install a record that not only records the dollar sale to the customers, but also the dollar sale to other departments such as new watches overhauled, bands fitted, etc. Such as these are interhouse, and the rate should be figured on a scale say of $1.00 an hour. These repairs done for the "house" should be recorded in a separate column which will be net, and the total once a month will revert back as "cost" to other departments.

The big problem *you* have is *you.* Are *you willing* to take part in a program that will put you and your profession ahead? Without your wholehearted participation nothing is going to happen to advantage.

I believe in "performance standards." To work or tussel with a known goal is like being ten feet off shore when out swimming, and so tired you can't paddle another stroke. The sight of that shore and your eyes pinned on it will get you there. Set up a "performance standard" or "quota" for the week or day, and you will be surprised to know "it can be done" and by thinking out a few short cuts it will be a cinch.

Are you being submerged with "habit"? Nothing can handicap a fellow more than *"habit."* The trouble with *habits* is that they seem to be all bad. There is only one good habit I know of that pertains to making more money, and that is *thinking.* Get off the treadmill in your work, and every time you catch yourself doing something "in the same old way" think it over and see if you can't devise a more efficient method.

How about those watches you wind and monkey with every morning for a couple or hours—aren't two-thirds of them regulated? Put them in envelopes and seal the envelope and file away—save 300 hours—$300.00 a year!

Don't handicap yourself with worn-out

and inefficient tools—the cost of tools is insignificant as compared with the cost of "time."

The cost of material is 10%; the cost of "time" is 50%. Are you going to chase the dime down the hill or are you going after the 50-cent piece? Avail yourself of modern systems, and when you get them *keep them stocked.* I know of one supply house that says an adequate stock of material, glasses, etc., consists of 12,000 parts and they cost 6 cents each on an average, and to be out of anyone of them costs 50 cents. Don't fool yourself and try to operate on a shoestring basis—this is a business—and requires an investment to operate it successfully just as any other business does.

Get on your horse! my friends, and get out in front by putting something in the job over, and above manual labor and grunts—do it right by injecting METHOD in your business.

Patronize Our Advertisers

A New Guild in Massachusetts

The Merimac Valley Guild was successfully organized as a unit of the M. H. A. and the U. H. A. of A. during last month. The meeting was presided over by State President Henry Desjardins.

New officers are: Warren Kunz, President; William Dunklee, Vice President; John Calem, Secretary; William Upton, Treasurer.

Thirty members were signed up at this meeting.

JOSEPH R. RICHARD, *Sec.,*
North Shore Guild.

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AERONAUTICAL INSTRUMENT SERVICE

Aircraft Instruments

EDITOR'S NOTE—Aeronautical Instrument Service is a subject untouched by publications in the Horological field, or in fact by any publication. In September, 1938, THE AMERICAN HOROLOGIST inaugurated such an educational service via prepared illustrated lectures to be used by U. H. A. A. organizations for the purpose of broadening our members' scope of knowledge in this field, which offered additional remuneration to those far-sighted enough to avail themselves of such knowledge.

ARTICLE No. 7

(Continued from March Issue)

Other float type fuel-level gauges.—Other types of float-actuated gauges depend on the float moving a lever, turning a steeply spiraled screw, or indicating directly by a pointer fastened to the top of the gauge. They are not distant reading, and must be placed on the side or above the fuel tank. There are several types which function fairly well in shallow tanks, but none of them hold up in service when adapted to deep tanks. A fundamental defect of these gauges is that only a small component of the buoyant force of the float is used. Consequently, a small bending or displacement of the moving parts may cause a slight binding or an increase in friction which is sufficient to counteract the effective component of the buoyant force. Then the float sticks. Bevel gears and bearing surfaces corrode in the presence of fuel fumes. In these cases the gauge should be removed and sent to an instrument shop for repair and adjustment, or be replaced by a new gauge. Figure 20 shows a fuel-level gauge of this type used.

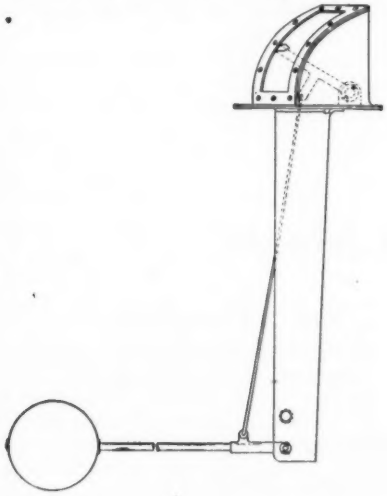

Fig. 20
Float Gauge for Shallow Tanks

Another float type gauge which has had considerable success on training airplanes where the tanks are located in the upper wing is that illustrated in Figure 21. It consists of a heavy Pyralin (celluloid) tube which extends below the tank a distance equal to the depth of the tank, and an indicating bob which operates inside the tube to show the depth of remaining fuel. The bob is attached to a float by means of a wire, and the float is inclosed

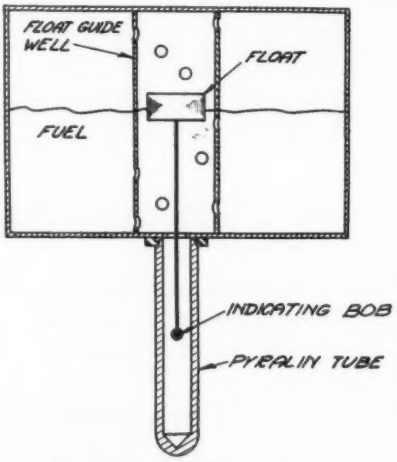

Fig. 21
Float Type Fuel-Level Gauge Used on Training Planes

in a perforated well or guide in the tank.

This gauge is simple and reliable. Its use is limited, due to being difficult to read accurately, being adaptable only to upper-wing tanks, and because of its added wind resistance. Streamlining the tube modifies the latter somewhat. The Pyralin tube was selected because of its fairly good transparency and because of its strength. It is inflammable, but so are many other things about aircraft, and usually sufficient precautions are taken to prevent fires occurring.

Sight glass fuel-level gauges. — Where the fuel tank is conveniently located (usually fuselage tanks are directly in front of the pilot) the use of a sight glass gauge is being resorted to as the most dependable at the present time. Sight glass gauges must be located where the pilot can observe

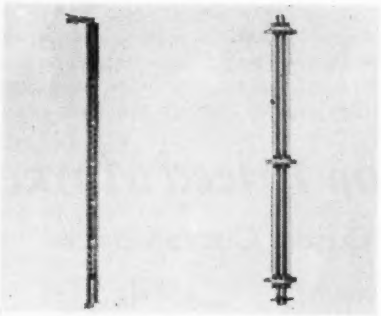

Fig. 22
Sight Glass Fuel Gauge with Metal Guard

Fig. 23
Steel Glass Fuel Gauge Without Wooden Guard

the fuel level at all times and where the glass will not be easily broken. However, the breakage has been less than might be expected. In one instance where frequent breakage did occur it was evidently due to a strain rather than a blow. The gauge should be located against the tank, if possible, to minimize the "position error." Because of the inherent position error, the gauge should be calibrated to read correctly when the aircraft is in "flying position," and the pilot should fly level during the time that he reads the gauge.

Figures 22 and 23 show two forms of this gauge. Figure 22 illustrates a metallic guard for the glass and in Figure 23 the glass tubes (this particular gauge having been used with two tanks) are imbedded in grooves in a balsa wood guard. In Figure 23 is also shown the use of fuel-resistant rubber hose connections. Since the tanks were over 30 inches deep the glass was mounted in two sections. The use of the hose connections is thought to be preferable to compression or packing gland joint connections. The Air Corps requires the use of a three-way valve in the line at the bottom of the gauge which connects to the bottom of the tank. This valve must be easily accessible to the pilot (an extension being provided if necessary) and so connected that when turned to the designated "off" position, the sight glass will be disconnected from the tank and drained to the outside of the fuselage through the third opening. When turned to the "on" position the gauge will be directly connected to the tank and the third opening closed. This arrangement provides a means of shut-off in case of breakage of the glass, and in addition is a convenient means whereby the operation of the gauge may be positively checked at any time. After the gauge glass has been drained and then turned on again, a quick return to the former level indicates a free passage between the tank and gauge. The top connection of the sight glass connects directly with the top of the fuel tank by means of suitable copper tubing. No pockets must be allowed in this line in which fuel can collect or fumes condense.

Hydrostatic pressure type fuel-level gauges.—The hydrostatic form of fuel-

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level gauge indicates the pressure of the fuel upon or at some point near the bottom of the tank. This pressure varies with the depth of fuel, and can be indicated on some form of a sensitive pressure gauge. This pressure gauge is usually marked directly in gallons rather than in pressure units or in depth of fuel. In order that the indicator may be mounted at a convenient point some distance from the tank, the pressure is usually transmitted to the indicator by means of an air column inclosed in a suitable metal tube of small internal diameter.

Figure 24 shows a set-up of hydrostatic fuel-level gauge of the above form. The cell is an inverted vessel which is open to the liquid on the bottom side. The top side is closed except for a small copper or brass tube (commonly one-eighth inch primer tubing) which is soldered into it to connect the cell to the indicator. This tube is known as the hydrostatic pressure line. The indicator is a sensitive pressure gauge with the dial calibrated for gallons of fuel. The pressure sensitive element of the indicator is in direct communication with the hydrostatic pressure line, and therefore with the cell also. A hand air pump located beneath the indicator is T connected

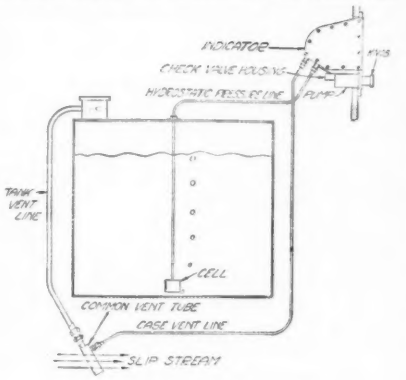

Fig. 24
Hydrostatic Type Fuel-Level Gauge

into the hydrostatic pressure line just outside the indicator case through a short length of small tubing. The hand pump is operated by pulling the knob out as

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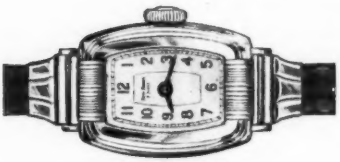

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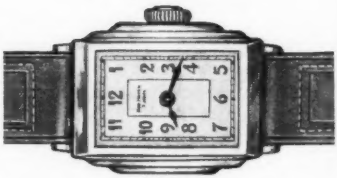

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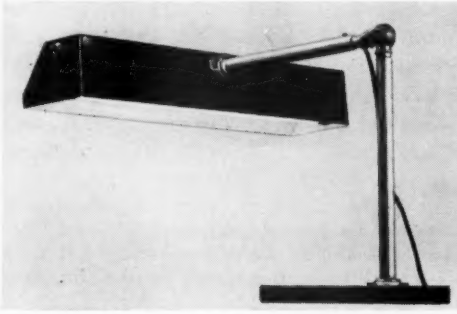
NEW HAVEN *Timepieces*

far as it will go and then releasing it. An internal return spring then forces the piston back into the pump cylinder carrying a charge of air before it. A check valve allows the air to flow into the hydrostatic pressure line, but prevents it from flowing from the line back into the pump.

As the charge of air flows into the hydrostatic pressure line a pressure is built up which clears that line and the cell of fuel and fuel fumes, and excess air bubbles out of the bottom of the cell and is lost. The check valve prevents loss of air back through the pump, and the system remains charged with air at a pressure dependent upon the depth of fuel. The deeper the fuel the greater the pressure. This pressure actuates the indicator to signify to the pilot the number of gallons of fuel remaining in the tank.

If the aircraft climbs into a region of decreased atmospheric pressure, the air within the system will expand accordingly. The excess air due to this expansion bubbles out the bottom of the cell and is lost. The indication will still be correct, however, since the cell is still completely filled with air. On the descent the air contracts, and the fuel rises in the cell, causing an error in indication. Operation of the pump supplies additional air to replace that lost due to decrease in atmospheric pressure, leaks, and other causes.

In order that only the differential pressure due to the depth of fuel will be indicated, it is necessary that the inside of the indicator case be subjected to identically the same pressure as is maintained above the fuel in the tank. The air-pressure system of forcing fuel to the carburetor is no longer used by the Air Corps, and therefore it might appear that the inside of the indicator case and the space above the fuel in the tank would normally be at the same pressure. Such is not always the case, however, due to variations in both the cockpit pressure and the pressure above the fuel in the tank. These variations are caused by changes in speed, angle of incidence, climb, descent, method of venting tank, location of the open end of the tank vent tube, etc. In order that the effect of these variations may be overcome, the scheme shown in Figure 24 has been designed. The tank vent line and the case vent line both open into a common larger line (approximately three-fourths inch diameter) located so that its open end protrudes into the slip stream at the angle shown. Both vent lines must be installed so that no "pockets" are formed in which fuel can collect and both must be able to drain into the common tube. The tank vent lines should be three-eighths inch tubing or larger (depending upon the size of the tank and the maximum rate of change of altitude during which an indication of the fuel supply may be desired) and as short as practicable to allow rapid equalization of the pressure within the tank with that of the atmosphere during rapid ascents or descents. The case vent line is usually one-eighth inch primer tubing. The indicator case must be airtight. It might be supposed that the case vent line could open directly into the tank to secure the same effect. This has been



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tried with the result that fuel fumes condense in the case vent line and even the indicator case has been known to fill up with the condensed fuel. The tank vent line should enter the tank at the highest point or a gooseneck should be formed to prevent a possible siphon being started through it. The filler neck is a good location for this line (see fig. 24). The cell should be located as near the center of a regular shaped tank as practicable to minimize the errors due to change in inclination of the aircraft. The indicator should be calibrated to indicate correctly when the aircraft is in "level flying position."

All hydrostatic gauges are affected by accelerations encountered in flight, and so far no very adequate scheme has been devised for effectively damping them out. Thus when an airplane makes a properly banked turn, is "zoomed," or is suddenly lifted by a rising current of air, the fuel bears harder upon the bottom of the fuel tank, the intensity of pressure increases, and a greater fuel supply is indicated than actually remains. Conversely, when a sudden current is encountered or the airplane is nosed downward, the fuel tends to lift off the bottom of the tank and the indication is decreased below the true reading. With a little practice, the pilot can learn to observe these acceleration effects and judge the true indication very closely.

Many failures of hydrostatic gauges have occurred on aircraft. The principal causes of failure have been faulty design, improper installation, improper venting of the fuel tank, air leaks in the system, and ignorance of principles of operation. Hydrostatic gauges when perfected should have the following advantages:

Be distant reading with the indicator in a convenient instrument board location.

Be applicable to all types of fuel tanks in all locations.

Require minimum alteration of the fuel tank.

Be easy to install.

Require the minimum amount of effort on the part of the pilot.

(Continued Next Issue)

National Honor Roll Trophy

The American Horological Honorary Roll Trophy sponsored by publication and editor will be given each year to the state holding the highest membership honors at the time of our National Conventions. Each year the winning state's name and year will be added to the trophy. When anyone state wins the trophy three times they shall become the permanent possessors of same.

The method of determining state statis will be decided prior or at National Convention this year. Some states feel their small population should be taken into consideration.

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Benjamin Franklin's Three-Wheeled Clock

By W. Barclay Stephens, M.D.

NO one who is familiar with the life of the sage, philosopher, statesman, and physicist, Benjamin Franklin, will be surprised to learn that among his numerous inventions there was a clock.

To the best of my knowledge, only one of his many biographers, and that the last, Van Doren, has made any reference to the clock, and in this case it is but a scant three lines.

Strange to say, Franklin mentions the clock only once in his voluminous writings, and then in a letter replying to his friend, Jan Ingenhausz of Vienna, who had evidently made in inquiry concerning the clock.

This clock of Franklin's was unique. Always a preacher of thrift, he in this instance practiced it by economizing on wheels, for there were only three wheels and two pinions.

It was during one of his long stays in London, probably in the year 1757, that the clock was made; whether he only devised it or had also an actual hand in its construction, is not known.

Some years before the making of the clock—1744, to be exact—there came to London a Scotchman, James Ferguson. He was by desire and interest an astronomer, but from financial stress, a portrait painter and a lecturer upon physics and mechanics. Being Scotch and, also, as Franklin, thrifty, he put his knowledge of physics and mechanics to the additional service of devising and making apparatus for demonstrating the motions of the heavenly bodies and other astronomical phenomena.

These two thrifty souls met and, drawn together by many common interests, became fast friends. The discussions between the unconventional, and often salty and piquant Quaker, Ben, and the rather strict Scotch Presbyterian, James, must have been at times both sharp and lively.

While there is no record to this effect, the clock was no doubt one of the prominent features of their discussions, for in 1758, not a great while after Franklin's invention, Ferguson made what he thought an improvement upon Franklin's clock and offered the improvement, with some degree of humility, in these words: "As Dr. Franklin, whom I rejoice to call my friend. is perhaps the last person in the world who would take anything amiss that looks like an amendment or improvement of any scheme he proposes, I have ventured to offer my thoughts concerning his clock, and how one might be made as simple as his, with some advantages. But I must confess that my alteration is attended with some inconveniences, of which his own are entirely free. I shall mention both, to the best of my knowledge, that they who choose to have such simple and cheap clocks may have them made in either way they please—"

FREE TO YOU!!

For a word phrase or sentence to convey the thought which will describe what a legitimate watchmaker should do to a customer's watch on a complete overhaul, put in order job.

The word cleaning and adjusting and all such phases, including overhaul and put in order are such mis-nomers every time. The customer does not appreciate what is meant by cleaning a watch: he thinks that means the whole job.

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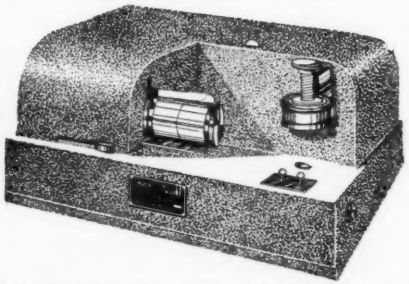

Write in for full particulars to National Headquarters, United Horological Association of America, Inc., 3226 East Colfax Avenue, Denver, Colorado.

It is to Ferguson that we are primarily, and probably entirely, indebted for a description of the Franklin clock. In the year 1773, there appeared the first edition of his "Select Mechanical Exercises," three more editions being published between this date and 1823. The first four pages of this book are allotted by Ferguson to a description of the Franklin clock, and immediately following is a description of his own improved clock. Both are illustrated.

Rees' Cyclopaedia of the Sciences, Arts and Literature was issued in its final edition in 1819 and contains descriptions and engravings of these two clocks, evidently founded upon the descriptions and illustrations in the "Select Mechanical Exercises."

These are the only books in which I have found them described. The cuts illustrating this article are from photographic enlargements of the old stained engravings in Rees.

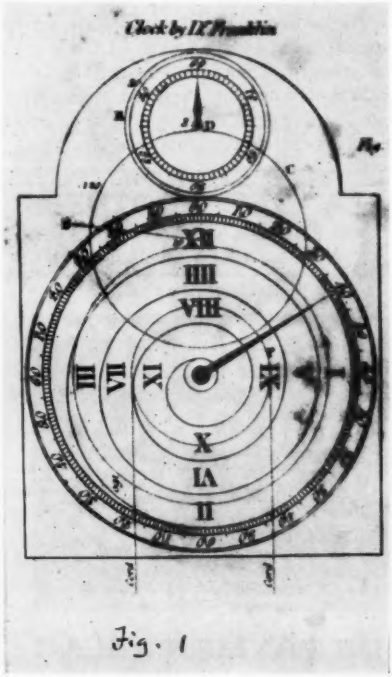

Fig. 1

In the "Select Mechanical Exercises," we have a description of Franklin's clock, and also an implied friendship. In the face of this record, it is difficult to reconcile the following excerpt from the letter of Franklin's referred to above and written at Passy, France, on April 29th, 1785. ". . . I do not know that my contrivance of a clock with three wheels only, which shows hours, minutes and seconds, has ever been published. I have seen several of them here in Paris that were made by Mr. Whitehead, and sent over, I believe, by Mr. Magellan . . ."

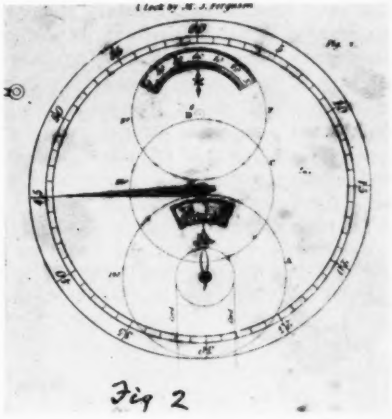
Fig 2

I have found no satisfactory solution for Franklin's apparent ignorance of Ferguson's published description. It is true that in that year, 1773, Franklin was deeply engrossed in the affairs of the colonies, trying to bring about a peaceful settlement between them and England, and that having failed in this endeavor, he left England in 1775, never to return. Then came the Revolutionary War, and his long residence in France.

It is possible that these weightier matters may have crowded the clock from his mind.

As he tells us in his letter, the clock shows hours, minutes and seconds. By looking at Fig. No. 1, three circles with broken lines will be seen. These represent the three wheels. The clock is driven by a weight, the cord passing over

a pulley (P) attached to the great wheel (A), which turns once in four hours. It has 160 teeth, and meshes with a pinion (B) of ten leaves. This pinion is attached to wheel (C)—the pinion and wheel turn in 10/160 of four hours, or 15 minutes. The wheel (C) has 120 teeth and meshes with an eight-leaved pinion attached to the escape wheel (E). Pinion (D) and wheel (E) turn in 8/120 of 15 minutes, i.e., once a minute. The escape wheel (E) has 30 teeth and is controlled by a seconds pendulum and its arbor carries a seconds hand.

There are no dial wheels. The main dial is divided into quadrants and each quadrant has 60 divisions at its circumference; i.e., minutes. As the single hand, which fits friction-tight upon the arbor of wheel (A), makes one revolution in four hours, instead of twelve, there have to be in each quadrant, three numerals and arranged as seen in the picture. These are Roman numerals.

In telling the time by this clock, the assumption is made that one would know within four hours the time, and, therefore, would know which numeral in the quadrant to use.

While this clock was impractical for ordinary use on account of the arrangement of the numerals, it was, when well made, a good time piece and of mechanically correct design.

Ferguson's clock, shown in Fig. No. 2, avoided the trouble about the numerals, but was more complicated and of less scund mechanical design than Franklin's.

A rather prolonged search for the present whereabouts of one of these clocks has not met with success. On my last visit to The Benjamin Franklin Institute at Philadelphia, I made particular inquiries, but none is there, or any record of the whereabouts of one.

The most recent authentic record of one is that appearing in the British Horological Journal of October, 1873. There it is stated, "This clock was made about the year 1819, for Roger Dartnell, Esq., M.D., Yongal, Co., Cork, and was used as his sidereal clock in his observatory, and hung on the wall of that place, until his death, in 1832, when it came into my possession by bequest from him.

"It is, I believe, the simplest form of a really useful clock ever contrived . . ."

The case of this clock was made of slabs of slate 1¼ inches thick. The escapement was a Graham dead beat; and the seconds pendulum, mercury compensated, was suspended from the back slab.

The ordinary Franklin clock had to be wound daily, but the weight of this clock just described had sufficient fall to run eight days and was equipped with a Huygens' pulley and counterpoise, thus avoiding the need of a maintaining spring.

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Pendulum Too Long for the Case

By J. E. COLEMAN
Member U. H. A. A. Technical Board.

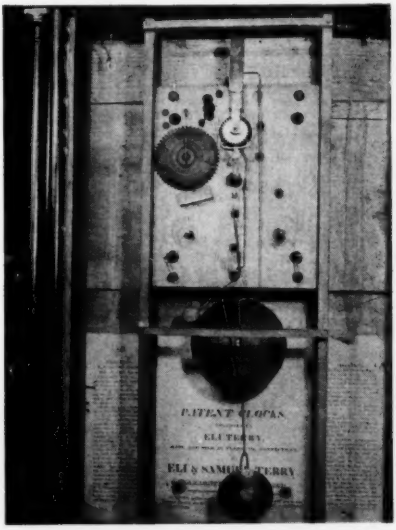
OCCASIONALLY the clockmaker is brought face to face with this problem, the photo vividly illustrates what seems to be the popular method of its solution; namely, instead of a thorough study of the movement and adapting it to a shorter pendulum, a method is usually devised whereby the long pendulum is made to work within the case. Such methods are nearly always unsatisfactory from the standpoint of reliable timekeeping, in spite of the fact they allow the shop to deliver the job.

Often, treasured family clocks are dug from the attic and presented to the clockmaker to be put in order; hands, pendulum-rod, pendulum ball and other easily detachable parts have been lost, such repair jobs have in many instances suffered severely at the hands of the "screw-driver expert" which may account for its having been relegated to the attic in the first place. It is not unusual to have a job presented where an effort has been made to substitute a different movement.

The "Improved Terry" wood movement was made with two escape wheels, 32 teeth, for the long pendulum in the taller cases and 42 teeth for the short pendulum in the shorter cases. In the job illustrated, it is impossible to determine whether or not some repairman had replaced a 42 tooth escape wheel with one of 32 teeth, or, substituted a whole movement with a 32 escape wheel, at any rate the clockmaker who rigged the arrangement illustrated must have been faced with the problem of making the long pendulum type, work in a short case. It can readily be seen how he solved his problem, by soft soldering a flat piece of brass to the brass escape wheel bridge, this added piece extending upward and riveted in its top end a split post to take the pendulum-spring. From this applied post hangs a 19½ inch pendulum, from the original post, directly under the hand center is a second pendulum rod and spring, attached by crutch loop to the added long rod. The verge being connected to the second rod by its crutch and loop in the usual manner.

This awkward arrangement gives a 19½ pendulum working in a case about 21 inches from top to floor, and while it must have timed up fairly accurate, the compounding of the pendulum rod greatly cuts down on the power (far les than half) applied to the pendulum to drive it. Further: since it is applied some three-fourths down the rod below the point of suspension the arc of swing is reduced to almost nothing.

The proper approach to problems of this kind is to first measure the space available for the pendulum, then, determine how many oscillations per hour your pendulum will make. Every good clock book gives explicit rules to follow, and most of them have tables whereby you may get the figure without ever working it out.



Next, count the exact number of revolutions the escape arbor must turn to drive the minute hand through exactly one hour. Dividing this number into the number of oscillations per hour for your pendulum

will give the number of oscillations per revolution of the escape arbor, as each tooth imparts two beats to the pendulum (one on the right and one on the left pallet) dividing by two will give the correct number of teeth for the escape wheel for making the given clock time up with the given pendulum. The application of the above rule to the problem presented by the clock illustrated is as follows: By counting the time-train it was found that the escape arbor turned 90 times per hour. From the original point of suspension just under the hand center to the window opening in the painted glass where it is desired to have the ball swing was 9½ inches. A reference to Gourdin's table shows that a pendulum 9.4 inches long beats 7,500 times per hour—dividing by 90 revolutions gives 83⅓ vibrations per revolution since we have some latitude in changing the pendulum by its regulating nut and can't have a third of a vibration we make it the whole number 84. Divide by two for two beats per tooth and we get 42, the correct number of teeth for a new escape wheel to properly time the clock to a pendulum swinging back of the window opening.

Lapel Emblem Buttons

Emblem buttons and pins are now available to members of United Horological Association of America, Inc., only. Purchase from your organization or from National Headquarters.

Gold-Plated Button	$0.75
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Members are under no obligation to purchase association emblem, but the use of a button or pin is recommended, and is valuable for purposes of identification.

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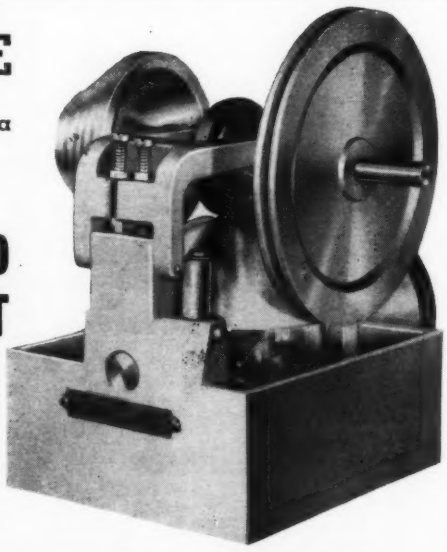

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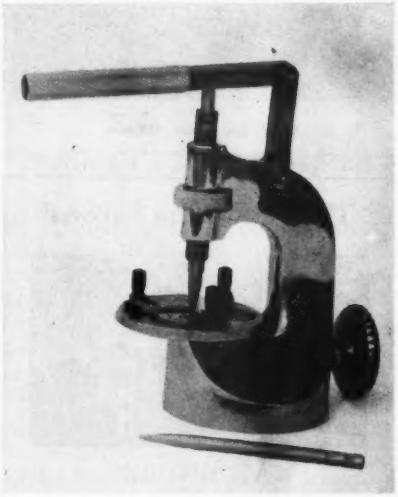
Uses of Friction Jeweling Tool

By JES. I. HANSEN

A GREAT deal can be said for and against friction jeweling, but the fact remains that it is the most rapid and efficient method of setting jewels yet devised.

I have constructed a self-centering face plate, which can be easily and quickly removed, when it is not in use. The work can be absolutely centered, because I use a center with an extremely long taper. A center with a long taper is always more accurate in centering, because a greater area or surface of the hole is brought in contact with the punch. The work is always upright and rigid when a face plate is used to set a jewel; also, any error in depthing in a seven jewel watch can be corrected.



Superior control and sensitivity can be developed with a screw feed.

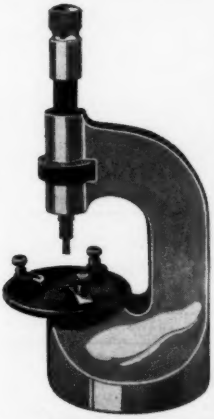
A screw feed is invaluable for removing roller tables. A combination of pressure and shock will remove the tightest roller table without damage. The shock is created by tapping the head lightly with a hammer.

The ordinary balance jewels of even the thinnest variety can be set without damage, due to the sensitive control which can be had with a screw feed. A hollow punch, which is just slightly smaller than the diameter of the jewel is the correct size to use when setting thin balance jewels.

The screw feed can be used very successfully to remove broken screws. It may be necessary to turn a punch and stump to the correct diameter. The end of the punch and stump would rest on the screw to be extracted. Pressure is then applied by means of the screw feed, and the plate is slowly rotated by hand. Most screws can be removed by this method.

Sometimes it is very difficult to bump a plate the correct amount, so that the endshake will be correct. By using the screw feed on the crowding tool, the plate on most seven jewel watches can be bent to the desired amount.

MODERNIZE YOUR JEWELING TOOL



Those possessing K. & D. Hansen Crowding Tool should have it fitted with the new face plate.

New plate with off center supplied and fitted including binder nut and drilling holes for lever (less lever) $5.50 postpaid.

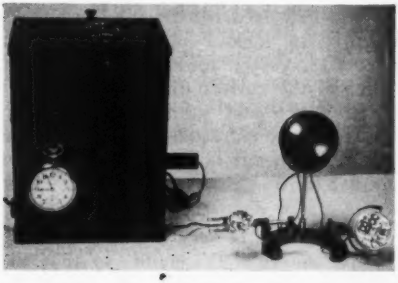
If you have face plate, we fit same as above, $2.50.

JES. I. HANSEN

501 E. 2ND AVE. DENVER, COLO.

Nebraska Horologist Makes His Own Watch Regulating Set

Mr. A. J. Auble of the firm of Auble Brothers, Ord, Nebr., has made his own watch regulating set which will detect a variation of from 1/200 to 1/500 of a second, depending on the precision of the watch being regulated.



The principle involves using the two levers in an electrical circuit with a loudspeaker. The different combinations of positions of the two levers produce different signals in the loudspeaker. One certain position covering a variation of 1/100 of a second produces no signal at all. One certain signal fades out during a variation of from 1/200 to 1/500 of a second. It is a simple matter then to manipulate the regulator of the watch being regulated so as to keep this signal at near half volume. Not allowing it to fade out or get louder.

Mr. Auble says that the cost of making one of these regulating sets is very little and that any good workman can easily make one.

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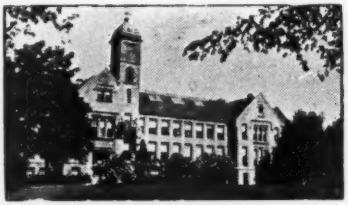

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Waltham Steps Forward

For the first time in the history of American watchmaking, fine-watch accuracy is now available in the new, small Waltham Premier watches.

The recent $29.75 smaller-than-a-dime ladies' watches in 17 jewels met with such enthusiastic consumer appreciation that the Waltham Watch Company has introduced three new women's styles in 15 jewels to retail at $24.75.

Furthermore, the new spherical movement for men used in the Waltham Premier "Patten" has been made available in three additional watches to retail at $39.75. They join the "Patten" in being the thinnest men's watches ever made in America.

Alert to all style trends the Waltham Watch Company has made many of its watches also available in the popular pink gold color.

The Waltham Premiers for 1940 are truly "Styled for Beauty—Built for Accuracy" . . . and made to sell!

Bradley's Annual Broadcast

The Bradley School of Horology, Peoria, Illinois, will present their annual broadcast on Wednesday, April 24th, from 11:30 to 12:30 midnight, C. S. T., over Station WMBD, 1440 kilocycles.

This program is an annual greeting to Bradley's thousands of graduates throughout the nation.

The program will consist of musical selections by the Bradley 60-piece band, and orchestral and vocal selections by Bradley students. Frederic R. Hamilton, President of Bradley College, Dean George J. Wild, and members of the faculty will extend greetings to their former students.

Dean Wild states that the response from Bradley alumni after last year's broadcast was very gratifying, and the school would again appreciate having a card or letter after the broadcast this year.

L & R MANUFACTURING COMPANY PERFECTS WATERLESS NON-FOAMING SOLUTION FOR DRY CLEANING WATCHES

As pioneer and leader in the manufacture of watch cleaning machines and solutions for the past ten years, the L & R Manufacturing Company has again taken the initiative in the production of a waterless, non-foaming watch cleaning solution (L & R WATERLESS NOFOME). As a result, today, even watches may be dry cleaned—a process unheard of, only yesterday.

One of the primary difficulties encountered in the cleaning of a watch has been the problem of dissolving the No. 1 Cleaning Solution in the Rinse. Theoretically it has been the age-old condition of oil and water not mixing. Thus, by eliminating the water from the No. 1 Solution the Rinse will completely dissolve the Cleaner, avoiding the necessity of pouring off the two solutions from the Rinse jars because one either settles or floats.

In the development of Waterless Nofome, however, L & R has not been content to perfect merely an ordinary dry Cleaning solution but has made such advancements in the preparation of this new solution that the results are practically fool-proof. In other words, actual tests have proven that parts cleaned in the new L & R WATERLESS NOFOME achieve a lustrous factory finish. Thus, the possibility of the accidental occurrence of rust or corrosion on the parts immersed is completely eliminated.

L & R WATERLESS NOFOME is golden amber in color. In perfect balance with L & R RINSE, it prolongs the life of the latter three or four times its usual span. Even if it affected only the economy involved, Waterless Nofome is a definite step forward.

In addition, however, to its cleaning superiority, Waterless Nofome is guaranteed uniform. Bought at any point between here and China or down to Australia, it will be a potent liquid, today or five years hence.

It contains no acid, cyanide, gasoline or abrasive and will not foam, streak, spot, leave a gummy residue or explode.

Watchmakers who have thus far used the new L & R WATERLESS NOFOME WATCH CLEANING SOLUTION have nothing but praise for "The Waterless Wonder."

Distributors of watch supplies, from coast to coast, already have a quantity in stock. It is certainly worth trying.

Welcome

W e invite you to attend our Fifth Annual Convention
I n Milwaukee, Wisconsin,. at Hotel Pfister,
S unday and Monday, April 21st and 22nd.
C ome and help us in our deliberations on
O ur plans for the future destiny of our craft.
N o one should miss this opportunity to
S hare the good fun provided for your entertainment.
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Our Biggest and Best Convention.

Watchmakers

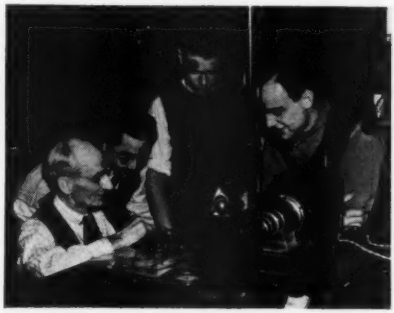
Girl Horologist Greatly Admired

Miss Ann Wrona, watchmaker in Woonsocket's largest department store in Woonsocket, Rhode Island.

Miss Wrona has been practicing the art and science of Horology for several years. We have two other lady watchmakers in our association, Laura Clemence and Margaret O'Brien of Bristol. They are members of the Rhode Island Horologist Association.

Elgin Attracts Students From Afar

As magnetized steel attracts metal so the Elgin Watchmaker's College, Elgin, Illinois, brings students from all parts of the globe.



To the 1940 class of this well-known horological school, started by the Elgin National Watch Company, have come three young men from far-flung countries: John Satre from Alaska, Jitsuo Ono from Honolulu, Hawaii, and F. A. Whitfield from Gujranwala, Punjab, India, where his parents were stationed as missionaries.

These men and many others from all parts of the United States make up the capacity enrollment for the current term in the watch college, now in its twentieth year of teaching the intricacies of fine watchmaking. During its life the college has trained many hundreds of young men and a few women who have scattered to all parts of the world to follow their trade. To these "alumni" dotted over the whole world, including every state in the union and many foreign lands, have come good jobs and good pay.

"We get students from the world over," explained W. H. Samelius, director of the famed school which teaches the art of watchmaking and repairing. "We've had them from Japan, South America, Canada, Alaska, and now India is added to the list."

Considering watchmaking as a trade with a definite future, more and more young people are turning their attentions to its possibilities. When they start think-

ing about a watchmaking career, they often decide to take either the one-year or two-year course at the Elgin school.

Cincinnati Guild

Cincinnati has been holding its meetings regularly, and at the meetings this year many good lectures have been contributed by the members. The Question Box has offered us a true source of subjects.

George F. Gruen, Jr., recently returned from his honeymoon.

Our sympathy goes to Joe Besse in his recent bereavement due to the death of his mother.

Cincinnati Guild is moving steadily forward.

R. J. FLAXMAYER, *News Editor.*

Cincinnati Guild held their monthly meeting, March 1st, with a good attendance.

Delegates chosen for State Convention, being held in Dayton, Ohio, April 7th. A bus will be chartered to transport delegates and attending members.

Much interest was displayed in the Educational Program, emanating from the Question Box.

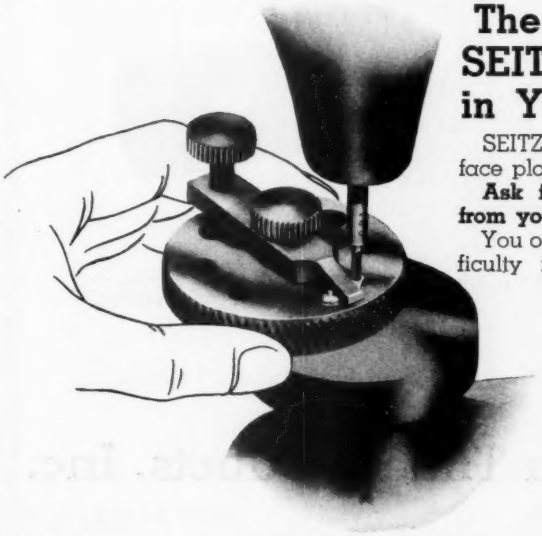
Frank Foegler gave an interesting talk on time-measuring instruments.

ELMER G. FISHER, *Cor. Sec.*

Motion Pictures 1938-1939 Conventions

Were you there? See yourself in the movies at these two conventions. Two showings in Cleveland.

Cleveland Museum of Art.



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